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The Effects of Collaborative Grouping on Student Engagement
in Middle School Students

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Abstract

This action research project investigated the impact of collaborative grouping on students' engagement in three middle level STEM (science, technology, engineering or math) classrooms. Research was conducted in two rural and one urban setting. Four data collection tools were used: A semantic rating scale (student questionnaire), teacher observations, student interviews, and teacher journaling. Data was categorized into three domains of student engagement: emotional, cognitive, and behavioral. Teamwork strategies were overtly taught to students before the study with additional instruction during the observation process as needed. While quantitative evidence implied a slight decrease in preference for collaborative learning by student's self-report, qualitative data showed positive results across the implementation. Research findings support the finding that collaborative grouping has a positive impact on student learning and fosters social-emotional skills beneficial for overall functioning in today's environment. Our findings suggest that middle-level classrooms benefit from incorporating collaborative learning activities when preceded by intentional group formation, instruction on how to participate effectively as a member of a collaborative team, and supplemented by re-teaching of group skills or re-grouping, as indicated by evidence of student engagement.

Keywords: collaboration, engagement, strategies, tools, collaborative grouping

Introduction

“Alone we can do so little, together we can do so much.”

--Helen Keller

Middle school teachers do well to consider Keller’s observation. In our experience as middle-level STEM teachers, we were conflicted about the overall advantages and disadvantages of collaborative group work. As passionate middle school teachers, we found we shared common concerns with our current students--in particular around student apathy. We noted a high occurrence of incomplete work, a tendency to ‘give up,’ and a pattern of ‘surviving’ in the classroom versus ‘striving.’ (By “surviving” we mean that students’ tended to just complete what was absolutely necessary to move through their school day. By “striving” we mean the student who appears to be emotionally and cognitively “present”, energized by, and invested in their own learning.)

After much discussion about potential reasons for students’ apathy, the team decided that perhaps some students appear not to be interested because they do not understand what they are learning and why they are learning it. The team then looked for potential classroom teaching strategies that would support increased student engagement in learning because engagement is vital in education. Fostering a collaborative culture in the classroom appeared to us as one potential strategy for improving student engagement.

Our team planned to analyze the effects of implementing collaborative grouping on student engagement in middle school classrooms.

The team researched happened in our three different Minnesota schools: one urban metropolitan middle school and two rural middle/high school settings in the southern and southeastern part of the state. The students in the study were in math,

science or STEM classes and their ages ranged from 11-14 years old. One district would be considered large, another medium, and the third small as far as enrollment size.

Our settings varied in racial and ethnic diversity, with a range of 40% (urban) to 10% (rural) students of color. One of the rural schools student population is 30% Latino/Hispanic. This is also a Title One school, with 44% of the student population eligible for free or reduced-price lunch. Student outcomes disaggregated by race, first-language, income, and gender demonstrate typical outcomes for our state.

By involving middle school students in their learning through collaborative groups, the research team aspired to: provide an outlet for positive social interaction, assist students working on difficult tasks, increase student engagement, foster lifelong employment and academic skills.

Review of Literature

This literature review synthesizes studies conducted on best-practices for collaborative grouping and the impact of collaborative grouping on middle-level student engagement. The review defines engagement and discusses measurements of engagement and its impacts in the classroom. Additionally, this analysis will explore collaboration as a tool for increased engagement, delving into the benefits of collaboration and specific strategies found to have a positive impact on engagement. Lastly, the literature review will discuss potential challenges collaboration may bring to the classroom for both teachers and students, as well as a few gaps in the literature.

Numerous studies identify positive impacts from collaborative learning (Contreras Leon & Chapeton Castro, 2016; Jansen, 2012; King & Rosenshine, 1993; Mosley, Ardito, & Scollins, 2016; Roseth, Johnson, & Johnson, 2008; Trespalacios, Chamberlin

& Gallagher, 2011; Turner, Christensen, Kackar-Cam, Trucano, & Fulmer, 2014).

Collaboration in an educational setting is used in many ways. It can be used to enhance critical thinking (Jansen, 2014; Mosley et al., 2016), create positive community feelings with a number of student with similar needs (Contreras Leon & Chapeton Castro, 2016), provide 'grit' through support of teammates (Brennen, 2017; Jacobs, 2016; Jansen, 2012), and increase academic and social abilities (Jansen, 2012; Roseth et al., 2008; Sears & Reagin, 2013; Turner et al., 2014; Trespalacios et al., 2011). Offering opportunities for students to engage themselves in collaborative learning set them up with tools to be confident and increase their abilities and interests in harder subjects, therefore helping them become more academically successful.

The Concept of Engagement

The literature gave several reasons why students engagement is important in the educational setting (Mosley, Ardito, & Scollins, 2016, Roseth, Johnson, & Johnson, 2008, Fredricks, Filsecker, & Lawson, 2016). "Engagement could be described as the holy grail of education," (Sinatra, Heddy, & Lombardi, 2015, p. 1); therefore, meaningful benefits happen when a student is engaged in their learning. However, there is little agreement on a concrete definition according to Sinatra and her colleagues (2015), as engagement varies in the theoretical perspective of the researcher.

Some research refers to student engagement as the working time in which students are fully involved in an academic task or plan related to the learning process (Finn & Zimmer 2012; Wong, 1998). Henrie, Halverson & Graham (2015) describe, student engagement appear as focused involvement in learning. Newmann (1992) defines engagement as "the student's psychological investment in an effort directed

toward learning, understanding, or mastering the knowledge, skills, or crafts that academic work is intended to promote” (p. 99). The most appealing definition of engagement at school about this research is a perspective that spans the spectrum, which has been characterized as a multidimensional construct with behavioral, emotional, and cognitive dimensions (Fredricks, Blumenfeld, & Paris, 2004; Sinatra et al., 2015). This literature review will use the multidimensional definition as it provides a framework for research making it possible to observe student work and collect data about actions, feelings, and willingness to learn.

Impact of Student Engagement

Using only one method of measuring student engagement may result in inconclusive evidence due to the qualitative nature of the data; therefore, it is essential to incorporate multiple measures of student engagement from a variety of sources in both individual and group tasks (Fredricks, et al, 2016). Methods of measuring student engagement include self-reports from students (Fredricks et al., 2016; Fredricks & McColskey, 2012), student surveys (Henrie et al., 2015), rating scales (Finn & Zimmer, 2012), and gathering qualitative observations from teachers and other support staff (Fredricks et al., 2004). Teachers can create these types of measures of student engagement tailored to the task in which the students are required to participate. The data from measuring student engagement may reveal the impacts the assigned tasks have on their level of engagement.

Studies link student engagement to higher achievement in school (Fredricks et al., 2016) mainly for middle school aged students (Roseth, et al., 2008; Turner, Christensen, Kackar-Cam, Trucano, & Fulmer, 2014). Students engaged in the classroom develop a

sense of belonging, inclusion, and begin to act and feel like a meaningful part of the classroom (Lemov, 2010; Roseth et al., 2008; Turner et al., 2014). According to Fredricks and her colleagues (2016), student engagement lowers a student's risk of participating in delinquent behaviors, substance abuse and experiencing depression. Furthermore, according to Finn & Zimmer (2012), the practice of remaining engaged results in the invaluable life skill of persistence (p. 99). On the other hand, students can experience quite the opposite when they become disengaged in the classroom. Middle school is a pivotal time in an adolescent's life where many changes are occurring (Roseth et al., 2008; Turner et al., 2014). Disengagement from school is common at this age, resulting in students pulling away and developing negative attitudes about school and learning (Turner et al., 2014). Fredricks and her colleagues (2016) note that teacher identify their most significant challenge as students disengagement.

Roseth et al.'s (2008) meta-analysis suggest middle school as a "fresh start" where students are given academic engagement opportunities to start building their knowledge to prepare them for their desired careers in the future eventually. As students begin to feel a sense of belonging in the classroom, which they may experience as feel like they are an important asset to the learning happening, they are more likely to experience success. Turner and her colleagues (2014) suggest that basic human needs consist of four principles, "autonomy, competence, relatedness/belongingness, and meaningfulness" (p. 1198). If these are essential parts of human existence, these principles, in turn, prove to be essential to student participation and engagement in the classroom (Turner et al., 2014). Education is a social, human event that involves people

learning in meaningful ways by interacting with each other. Therefore, teachers should embrace, teach, encourage, and facilitate students engaging with each other.

Benefits of Collaborative Learning

Traditional classroom practice supports little group work and collaboration, but lately, more focus is going toward ways of engaging students to maximize learning (Jansen, 2012, Sears, 2013, Trespalacios, 2011). Findings reveal that collaborative learning significantly enhances critical thinking in students (Mosley, et al., 2016). Some middle and high school students perceive certain subjects as hard, and in a sense, fail before even trying, according to Mosley and his colleagues (2016). Giving students the option of cooperative learning can offer them tools to improve their confidence and increase interest in harder subjects. A meta-analysis, encompassing 80 years of research, confirmed that when students are working productively in cooperative groups, they are more likely to participate, to develop positive attitudes toward others and content, and to exert more effort (Roseth et al., 2008). Research also indicates that through group work, students can improve their genuine engagement in the content (Roseth et al., 2008), ask better questions (King & Rosenshine, 1993), and offer meaningful explanations.

Collaboration benefits students when working on difficult tasks in particular because it allows them to make progress as a group (Jansen, 2012). Collaborative learning gives students the support they need in an instructional environment, having a positive effect on their ability to learn. One study involving 2,141 eighth graders noted a significant positive correlation of 0.71 between social engagement and academic engagement (Finn & Zimmer, 2012).

Team characteristics become quite apparent to members when they learn that everyone on the team is learning, and no one team member knows everything. In fact, according to Jansen (2014), collaboration can even fill in gaps in learning that might otherwise not be filled by using critical thinking skills needed to provide explanations to classmates. Learning from each other has a strength that is very empowering (Jansen, 2012; Mosley et al., 2016; Trespalacios, Chamberlin & Gallagher, 2011).

Collaborative learning promotes changes in the classroom beyond academics by fostering critical social consciousness among students as individuals. Roseth et al. (2008) found, after their 30-year longitudinal study, that there is a positive interrelationship between meeting academic and social goals when teachers choose to use cooperative structures in learning situations. The new collaborative classroom encourages personal growth and social awareness among participants (Contreras León & Chapetón Castro, 2016). Brennen (2017) went as far to say “whether it’s students, a team or an individual, our best ‘doing’ happens when we are being our best selves” (para. 2). Social learning is an opportunity to overcome disrespectful, rude, and disruptive behaviors that are damaging at school as well as in society.

Learning new content is difficult. It is normal to be frustrated when trying or learning something new or unfamiliar. Collaborative learning teaches mindfulness of others and ourselves (Jansen, 2012; Turner et al., 2014). Turner and her colleagues (2014) state, “how classroom participants act together can support students’ value for learning as well as their beliefs that they can be successful, their willingness to engage, and how related they feel to others” (p. 1197-1198). This willingness to engage supports students’ personal growth which is an outcome of teacher-facilitated collaboration and

students' dispositions, especially specific to the mathematics classroom, improve over time through this facilitated collaboration (Jansen, 2012). Moreover, Jansen (2012) reported, after studying two different techniques for implementing collaboration in the mathematics classroom, that students' viewpoints about the subject of mathematics as a "fixed" or "growth" intellect changed for the better. When humans are more socially and emotionally aware, and are more effective in thinking, learning, and communicating, they are prepared to be their best. Human beings are prone to 'do' and when humans help others be their best, they do their best (Brennen, 2017). Hence, the human social element of collaborative learning fosters the human element of doing. The ultimate goal is to strive for cooperation beyond the classroom bringing such principles to life and communities around the world.

In addition to increasing academic and social abilities in students, collaborative learning also strengthens student independence when group members feel accountable to their teammates (Jacobs, 2016). Well-taught collaboration has teamwork framed around positive interdependence. Jacobs (2016) suggests examples of quality collaboration independent, focused activities. These activities include a roster of individual tasks and due dates with students assessing each other's ability. Students giving feedback to individual team members while expressing the gratitude of each other's ideas. As well as, creating individual presentations on behalf of the team. Consequently, if one of the group members does poorly, so does the team; therefore they are likely to strive to do well for themselves for the good of the group (Jacobs, 2016). Sears and Reagin (2013) and Trespalacios et al. (2011) suggest that traditional students working within collaborative

groups might even show increased motivation which leads to positive gains and learning outcomes.

Notably, there is evidence that girls in STEM classes that utilize collaborative learning have improved outcomes (Anderson, 2018). Creative problem solving, emphasis on growth-mindset, facilitation of social interaction and critical thinking that well-structured collaborative projects entail align with what is known about best-practices in STEM education, in particular for girls (TPT, 2017).

Moreover, the availability of digital tools that streamline collaborative learning activities encourages us to recognize that teaching students' effective collaboration techniques will benefit their learning now but also their ability to succeed in post-secondary activities. Trespalacios et al. (2011) note that providing opportunities for students to collaborate boosts their motivation to learn. Collaborative learning forms an essential element in the creation of peaceful, just, and equitable societies (Jacobs, 2016). Applying and developing the collaborative learning skills in the youth of today can only help our communities become stronger together.

Grouping Strategies

Before students can collaborate, a teacher must first consider how the grouping of students will occur. McGlynn and Kozlowski (2016) suggest that student grouping should be a purposeful process for effective collaboration to occur between students (p. 67). One grouping strategy is to create smaller groups of students with some similar abilities, such as academic level, that will motivate them to work together (LeMier, 2012; Rubin, 2008). This type of grouping method could boost confidence due to the similar abilities and small numbers within the group. Another grouping method is considered

flexible grouping, where students work in temporary pairs or small or large groups which can offer a variety of ways to learn the material, depending on what the learning task is. According to Stronge (2007), flexible grouping supports a wide variety of learning outcomes dependent on the task goals.

Teachers must be careful not to create ineffective student groups. Results of ability grouping without differentiated supports have shown to be more harmful than helpful to the low-ability groups (Hoffer, 1992; Stronge, 2007). Hoffer's 1992 study involving 3,116 seventh graders and 2,829 tenth graders found that students placed in low-ability groups learned significantly less science and mathematics than their high-ability grouped and non-ability grouped peers (p. 217-218). If teachers are going to pursue ability grouping, using assessment data to create ability-leveled groups carefully is recommended (Stronge, 2007). Furthermore, grouping students who are too much alike may result in a concept called *groupthink*, where there is no growth due to the constant agreement because each member of the group already knows what the other knows (Dweck, 2006). When students who think alike hit a wall, they may not be able to think outside the box when expanding their knowledge or successfully completing a task.

After creating student groups, teachers can facilitate improved outcomes with instructional strategies designed to facilitate student work in groups. Such strategies include promoting discussions amongst each other (rather than the teacher) and use of conversation around different perceptions (over correct answers) which encourage students to collaborate autonomously (Jansen, 2012). In addition to the strategies mentioned above, Rubin (2008), Turner et al. (2014), and McGlynn et al. (2016) suggest explicitly teaching classroom routines, mutual respect, and use of collaborative working

skills with group members. Furthermore, pointedly teaching students how to facilitate, question, listen, organize, and record group process and progress will improve student outcomes and experience (Rubin, 2008). Purposely teaching students the skills of how to collaborate--before expecting them to work together--provides essential structure for successful group work.

Lastly, once students have been grouped and taught how to work together effectively, there is another strategy to reinforce as the group begins to work on the task. The “complementary model for collaboration,” as described by Sears and Reagin (2013, p. 1156), suggests charging each student with a portion of the whole task. This complementary method provides students the opportunity to interact and make swift progress. In a traditional mathematics class solving the Magic Triangle problem, Sears and Reagin (2013) discovered that their collaborative groups out-performed individuals, with a mean difference of 1.25 for groups over individuals (p. 1166). The students who were of average ability level (specifically not accelerated) benefited more from having the opportunity to collaborate with each other to discuss strategy than they would have individually (Sears & Reagin, 2013). Through careful implementation of collaboration in the classroom, students can improve their strategies and skills academically, in addition to feeling more motivated and empowered.

Challenges of Collaboration

Effective collaboration in an educational setting is not an easy strategy to teach. There are challenges to developing positive interaction tools that are effective enough to foster cooperative student work. Social interaction is an integral part of teaching the learning process at any school. Much of a child’s exposure to language happens at school

(Contreras León & Chapetón Castro, 2016, p. 126). In many academic school settings students demonstrate “disrespectful behaviors or disturbing attitudes and activities such as disruptive talking, clowning verbal insults, rudeness, and bullying that hinder the teaching and learning processes” (León et al., 2016, p. 126). There are roadblocks and obstacles for students to become the best version of themselves. Effective communication skills and the ability to establish and maintain positive personal relationships is a primary focus during school. Many schools suffer “socially deprived settings characterized by violence, low-income, one-parent families, poor housing conditions, and few opportunities for social promotion” (León et al., 2016, p. 126). It is critical for teachers, educational institutions, and societies to find methods to teach students positive ways to interact and support each other which will foster communication and social intelligence. Collaboration and learning cannot happen without students having strong relationship skills.

A paradigm shift needs to happen in our American classrooms because cooperative work between students relies on a teacher’s ability to learn how to prepare and deliver effective lessons. Day (2017) went so far as to say the American mantra believes the answer to all of our education problems is “more - everything can be solved with more” (para. 2). More after-school intervention programs, more testing, more meetings, more classes before and after school. Day (2015) and Walker (2017) both conclude that teachers are overworked and overstressed, which leads to frustrations and burn-outs. This mentality, according to Day (2015) and Walker (2017), transfers to students, possibly resulting in shutting down or giving up. School days are less productive for both students and teachers if this happens.

State assessments often seem to be the focal point of an educational curriculum. As Rentner, Kober, Frizzell, and Ferguson (2016) state, many teachers believe too much time is spent preparing students for state- and district-mandated tests and administering the tests. Roughly one-third of teachers estimate that they spend more than a month out of the school year preparing students for state- and district-mandated exams (Rentner et al., 2016, p. 7). A teacher is forced to teach to a test so districts can sort, group, and intervene with student learning. Learning becomes longitudinal with little depth when truly it should be an exploration of a wide flourishing river. According to An & Reigeluth (2012), the top perceived barrier to a completely collaborative school setting is a school's focus on state testing as the current American education system is focused more on sorting intelligence than teaching learning. Roseth et al. (2008) found that teachers need the continuous training necessary to provide and foster effective collaboration in the classroom. Sufficiently trained teachers can cultivate collaboration skills in their students, as well.

Collaboration in American institutions simply will not happen unless teachers effectively teach social skills (Contreras León & Chapetón Castro, 2016). Teachers must also learn how to create successful cooperative lessons which are inspiring and engaging to students (Walker et al., 2017) and small steps are made in an educational shift away from standardized testing. These are significant obstacles but do not make the task impossible.

Conclusion

There does not appear to be an agreed upon amount of time that teachers need to be able to design effective collaboration activities. The issue of how to shift the focus of

education away from testing has also not been thoroughly addressed. A few different definitions of student engagement arose within our literature review. We decided to use a definition that has multidimensional constructs including behavioral, emotional, and cognitive dimensions (Finn & Zimmer, 2012; Sinatra et al., 2015). Using this multidimensional definition will allow us to collect data concerning students' actions, feelings, and willingness to learn.

Educators need to be provided time to create effective collaborative lessons. America believes the answer to all of our education problems is “more - everything can be solved with more” (Day, 2015). This notion of ‘more’ creates intense days at school for teachers and students resulting in exhaustion at times. Just like students, teachers need to be trained and granted the gift of time to become better at their trade, through productive time with colleagues and departments. “Providing time for teacher collaboration and learning is one of the most powerful things schools can do to improve learning because collaboration that lacks a focus will do nothing to improve schools” (McNeff, 2017, p. 12). Teachers need time and training to learn how to create an effective collaborative classroom as well as prepare for this instructional strategy.

To the extent that collaborative learning may not align with the current focus on measuring student outcomes through repeated and ongoing standardized testing, McNeff called for a paradigm shift in our educational system--away from so much focus on mandated testing: “We should start by critically examining the structure of a school day” (2017, p. 12). According to McNeff, quality instruction needs to be the focus, rather than quantity. Collaboration is a quality teaching strategy that develops and fosters a higher level of learning. How can schools expect collaboration of teachers to happen at a high

level with the need for them to squeeze it in briefly before school, during prep time, lunch, or after school? McNeff (2017) discusses:

There is some belief that the school day needs to be lengthened to improve student achievement and test scores. We seem to think that if we have more time in front of kids, they will learn more and perform better. What if we reduce the amount of instructional time and build in teacher collaboration that is focused on improving instruction? Instead of focusing on quantity of instruction, we focus on quality of instruction positive movement toward educational change. (p.12).

A significant movement in our American education system might be like moving a mountain - not impossible but challenging. Perhaps this is why there is minimal mention of strategies for change in our American education system. Moving a mountain could be an insurmountable task.

In essence, there are a few areas for refinement in the literature about collaboration and its effects on student engagement. The definition of student engagement can be many shades of gray that require critical examination by researchers. Opportunities for teachers to plan effective collaborative lessons in their intense work days would require creative and critical strategic planning. Finally, a shift in an American educational focus away from testing would promote further opportunities for collaborative work.

Methodology

In order to find out how collaborative student grouping affects engagement in a middle school classroom, our research team committed to making group tasks a priority for seven weeks and to using action research to investigate our intervention. Action

research is a reflective process of problem solving with a goal of improving what educators are already practicing in their classrooms (Sagar, 2000). Action research is a reflective process of problem solving with a goal of improving what educators are already practicing in their classrooms (Sagar, 2000).

Shannon Timmer conducted the research throughout Astronomy and Physics units, Jeanine Backer conducted the study throughout Design and Modeling units, and Jaymeson Miller conducted the study throughout the Measurement, Data Analysis and General Math Review units.

We decided we would collect and analyze data on a subset of ten students per class so we could gather more in depth information and generate a manageable amount of data to analyze. However, to be fair, normalize the experience, and set a positive tone for the intervention, all of the students in the class would be receiving the interventions and participate in collaborative learning; however, the only collected data would be from the students selected to be in the study. We sent home a passive-consent letter (Appendix A) explaining our research to the parents of all students in each of our classes. We read the letter with all of our students and instructed them to encourage their parents to read it as well, and to let us know if they had any concerns, questions, or if they wanted to opt out. We did not have any parents who opted their child out of the study.

Next, we selected students for our study. Jaymeson and Shannon were able to randomly select ten students in their classrooms by choosing sticks with students' names on them to become study participants. Jeanine chose a class for this particular study that was already exactly ten students. Therefore, we had a total of thirty students in this case

study (Figure 1), which is a process that allowed us to research this particular group's development over a period of time.

Figure 1. Students in Study

<i>School/Grade Level</i>	<i>Class</i>
<i>Rural 6th Grade</i>	<i>Mathematics</i>
<i>Rural 7th Grade</i>	<i>STEM</i>
<i>Urban 8th Grade</i>	<i>Science</i>

We then placed students into initial flexible learning groups based on personality similarities. This is considered flexible grouping, where students work in temporary pairs offering a variety of ways to learn the material, depending on what the learning task is. According to Stronge (2007), flexible grouping supports a wide variety of learning outcomes dependent on the task goals.

To find out the similarities between our students, we searched for an engaging digital tool that would categorize them. We had every student in each class take three National Geographic personality quizzes (Appendix B) that grouped them by commonalities and interests: what superpower they should have; what musical instrument they would be; and, what planet they would most likely call home. Each quiz asks a series of eight questions that gives them six options to choose from. From there, the quiz gives them a final result based on how the students answered the questions. We had the students write their names on a piece of paper and list their final results then return the paper to us. We grouped students based on how similarly they answered the questions. For example, if two or three students chose "Flying-Cello-Venus," then put them in the same group for the study. Due to having tables that seated three to four students, we also

tried to group entire tables based on similar results from the quizzes. Student groups were flexible and some changed once or twice throughout the course of data collection. Each time changes were made we based the change on the original quiz results or by using professional discretion.

We started data collection by having students complete the Pre- Questionnaire, a semantic differential rating scale (Appendix C), to find out how they felt about collaborative work prior to implementing the intervention. This questionnaire was created in Google Forms and administered in week one and at the end of the seven weeks. Student responded to questions about their current feelings toward group work. Questions elicited qualitative and quantitative information regarding students' feelings toward collaborative tasks in class. The questions measured the three important domains of engagement: emotional, cognitive, and behavioral.

Behavioral engagement would include seeing such things as sitting by your teammate, gathering supplies together, helping or assisting a teammate to create something, and successfully splitting up duties to be completed to make individual progress toward a team goal. Emotional engagement would include such things as demonstrating patience while working together, listening to each other's ideas, making eye contact when speaking to each other, and using a friendly tone of voice while collaborating. Cognitive engagement would include such things as hearing teams sharing creative ideas with each other, explaining their solutions to another on their team, or critically thinking through a solution together.

Our second source of data came from the observations of students during assigned group work time. Student engagement (Appendix D) was measured by observation of the

ten designated students by recording the degree of on-task behavior. Observations were conducted by an adult observer in the classroom once every other week during weeks two, four, and six. Data collection occurred on each student at five-minute intervals for twenty minutes, for a total of five sets of data for each student on each of the three observation periods. At each interval of time, the observer would record a number, 1-4, that described how engaged the student appeared, which would also indicate what kind of perceived engagement was occurring at that time (emotional, cognitive or behavioral). During and at the end of each session, the adult observer would record any observations and inferences made during those twenty minutes. Data from this tool was analyzed using a method of comparing findings in the first observations to the last, and looking for positive, negative, or no change patterns according to the calculated mean.

Thirdly, we used a student conferencing procedure to gather students' perception of their engagement in the collaborative work (Appendix E). This tool was facilitated as an individual personal conference with students and their teacher. We conferenced with the students every other week for a total of three times during our study. Each student conference provided further qualitative data of student perceptions of their own engagement during collaborative group work. Conferences were audio recorded and then transcribed later by the teacher. The questions were designed to gather on-the-spot qualitative data, which then successfully allowed us to make any necessary and immediate interventions with the collaborative working groups in order to help them operate more effectively and improve their engagement. Questions were designed to collecting data on emotional, behavioral, and cognitive perceptions of engagement.

We used grounded theory to simplify the information gathered, determining which aspects of the dialogue should be emphasized, minimized, or left out of our analysis altogether. Grounded theory ... (definition/citation). We looked for trends or commonalities deeply rooted in the results and assigned codes to the responses to help group the comments into our designated domains: emotional, behavioral, and cognitive. We identified the quotes that best illustrate the themes found. Additionally, this tool would be cross-referenced with the semantic differential rating scale in order to pinpoint how their level of engagement changed throughout the research timeline.

Our fourth and final data collection tool was the Teacher Reflection Journal (Appendix F) which allowed each of us to record observations and inferences of student engagement during and after collaborative group work. We were able to observe activities such as movement around the room, reading, writing, speaking, demonstration of critical thinking, use of computers, and engaging in creativity. This tool helped us identify some students not appearing to remain engaged during a data collection day. These observations further allowed us to make immediate interventions when necessary. The data collection tool has a list of possible steps or strategies used, if any, to re-engage the learner(s) who were off task or disengaged such as: proximity, private conversation with individual, student removed from the group, communication with parent. This tool also helped answer whether the intervention had a positive effect on data through observational commentary. At the very bottom of the Teacher Reflection Journal, a space is provided to record written thoughts and impressions of the interventions tried with student(s) challenged to stay engaged in the lesson for the day. We collected observational data on the students every other week for a total of three sessions for each

student. Again, student observations were noted and categorized into emotional, behavioral, and cognitive domains. If some students did not appear to remain engaged, this tool allowed us to record potential steps used, if any, to re-engage the learner(s) who were off task or disengaged. It allowed us to reflect and record thoughts about the intervention tried with the particular student to increase or maximize engagement in a task.

At the end of the study, we had comprehensive data that was collected through classroom observations, questionnaires, and student conferences. These tools allowed us to observe the students' behavioral, emotional, and cognitive engagement through collaborative group work. The final data collection piece was one last fulfillment of the student Semantic Differential Rating Scale (Appendix C) by all thirty students as a Post-Questionnaire tool. The data collected was holistic and allowed us to analyze if collaborative grouping strategies had an effect on student engagement. Although our team checked in with each other and asked questions regularly throughout the data collection process, we waited to meet as a group to discuss our final results and data collected from the collaborative group study after the completion of data collection.

Analysis of Data

All of our data can be categorized into three important domains of student engagement: emotional, cognitive, and behavioral. Emotional engagement refers to students demonstrating several qualities while working with a team such as: patience, interest, listening skills, kindness, happiness, enthusiasm and other cues that show their feelings towards collaboration. Cognitive engagement refers to team members sharing ideas with each other, suggesting changes and improvements, brainstorming together,

explaining solutions to team members, critically thinking out loud, and other cues that show using their heads to work together. Behavioral engagement refers to visible demonstration of team work such as sitting proximate, selecting supplies together, helping to create together, sharing of duties, and other cues that show the external behaviors of collaboration.

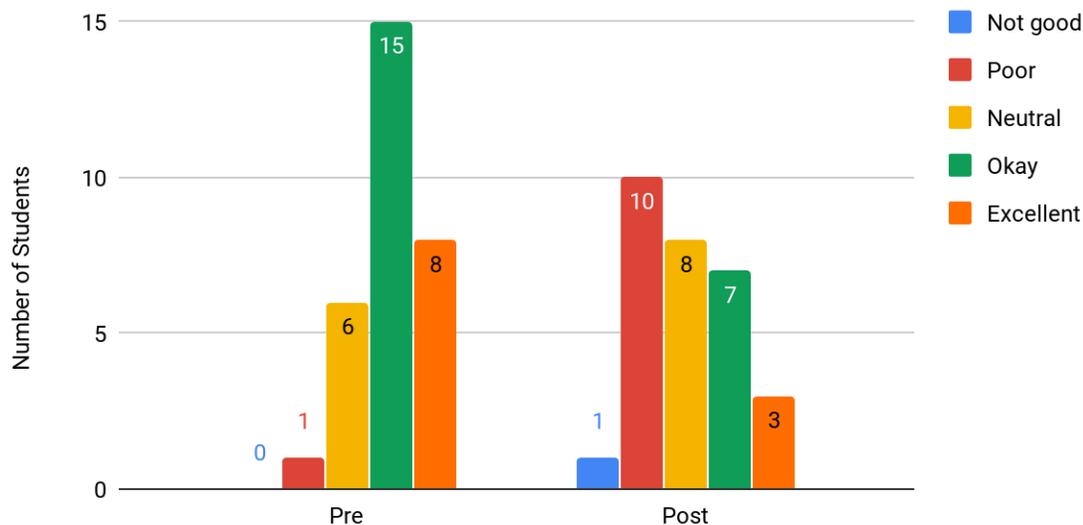
Emotional Engagement

In the beginning of our research, students were grouped with others according to personality similarities using an online questionnaire tool. Then they reported on the Semantic Differential Rating Scale (Appendix C) that they had better feelings toward group work than they did in the end (Figure 2). However, despite this decrease in feelings towards group work, eighteen students remained positive or neutral regarding their feelings on group work compared to the remaining eleven students who reported more negative responses towards group work.

Figure 2. Perceptions of Group Work

Perceptions of Group Work

Overall, my feelings about working with my group are...



The reason for the largest growth from the pre- to the post-questionnaire was referring to the emotional domain, suggesting the students thought group work was more conducive to “their learning styles” and “more fun” (Appendices G & H). One student in Jaymeson’s class said they appreciated “practicing compromise and trust in others” (JM4, personal communication, April 5, 2018). During one student conference in Jeanine’s class, a student claimed, “If you aren't comfortable with your teammate, you won't be able to talk well. We are good friend so if felt safe to talk” (JB3, personal communication, April 9, 2018). It was a common theme observed: students’ perceptions of group work and their ability to engage changed depending on who they were working with. Another student from Jeanine’s STEM class commented that they sometimes get silly when they work with their partner because they are good friends but it’s okay because they still get their work done (JB10, personal communication, March 22, 2018). The same idea was found in Shannon’s science class by one student, mentioning

“Sometimes we get a little chatty” and requesting that Shannon tell them “to focus more,” but that they would work with that group again because “they make doing the work easy and fun” (ST5, personal communication, April 4, 2018). Even though there was a decrease in student’s final emotional perceptions of collaborative engagement, they still commented positively on the values of working in a group. In Shannon’s science class, a student admitted her partner made her feel more comfortable, “If I don’t know something, she doesn’t make me feel like I don’t know anything” (ST9, personal communication, April 4, 2018). Students preferred to work with people they were comfortable with, allowing them to take team risks.

Although there are clear benefits to being comfortable with the people in a group, work productivity being one of them, this also came with some conflicts. Individual personalities, work ethic, academic differences, and other barriers between students became apparent. As noted by one individual, “I have anxiety when a teacher tells me who my teammate is. I just hope that it goes well” (JB1, personal communication, April 9th, 2018). Still another comment about how, “It’s hard to work together because our personalities are the same, but we just don’t work at the same pace.” (ST6, personal communication, May 2, 2018). The same student was overheard by Shannon during data collection on the Teacher Journal Tool that they don’t “want to be another black failure.” This data leads us to believe that students with low self-efficacy may feel like they hold their team back academically during group collaboration; therefore, they disengage themselves from the group.

Our team also noticed some marked improvements among some individual students within the emotional engagement domain. At the beginning of the study, one

student claimed, “Some of us are shy... some people don’t like to voice their answers” (ST3, personal communication, April 4, 2018), but by the end of the study the same student responded that when their group comes across a challenge, they “talk about it” to get through it. Another student visibly changed and interacted more when their group members changed halfway through the study, as observed and described in Jaymeson’s Observation Teacher Journal (Appendix D) during the first week of the study, March 12, 2018. This same student that sat back and watched the group do the tasks in the beginning, careful to take it all in but not speak due to shyness, showed growth and confidence by the end of the study. The group functioned cohesively, as observed starting on April 23, 2018, and this particular student even lead the discussion and offered resources and ideas for solving their task. “[The student] came out of their shell, was comfortable with the group and participated well” (Miller, 2018). Still, another student made remarkable gains in the ability to connect emotionally with the team. As noted in Jeanine’s Observation Teacher Journal (Appendix D) from her first data collection on February 26th, 2018, “this student seems to shut down and stop interacting with the group” (Backer, 2018). This precipitated teacher reflection with an outcome of an intervention tool for this particular student. This new Student Group Work Checklist allowed one-on-one direct instruction for any student and teacher to dialogue about how to emotionally connect when working in a group (Appendix J). This checklist was used regularly after the first data collection during group time with one student in Jeanine’s class. The Student Group Work Checklist became very important for this student. Requests were made by the student at the beginning of each class to discuss the checklist, date it, and set it on top of the student’s pile of books for use during class time. It became

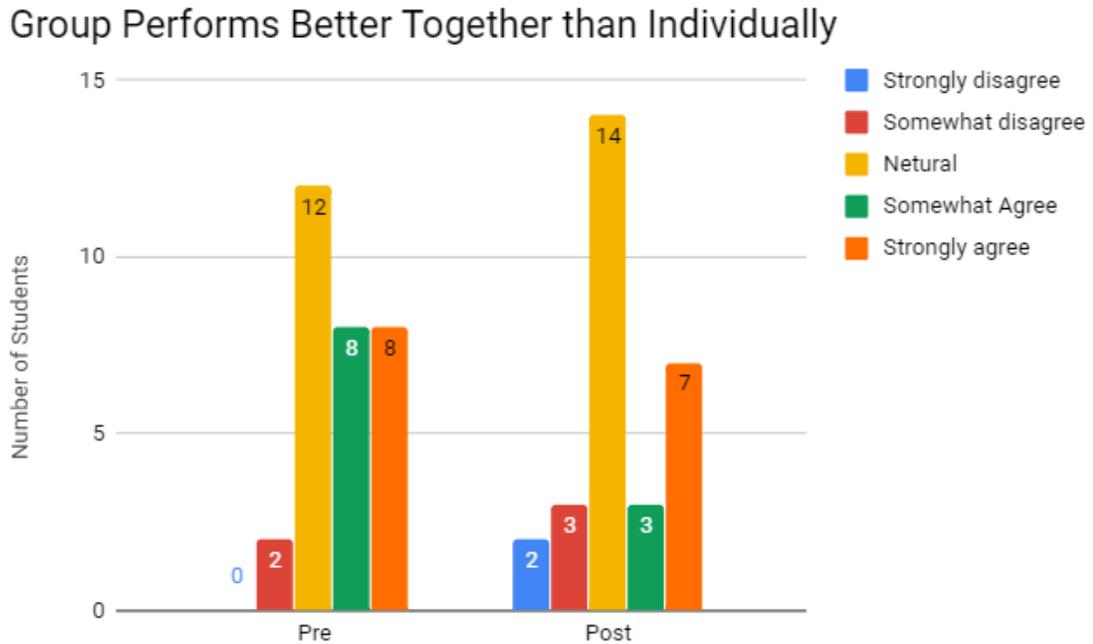
evident to Jeanine that this student needed this tool as a guide for emotional appropriateness and consideration during group work time. Jeanine notes that this student often underlines (with very bold lines), “Be accepting of others’ ideas even if you don’t agree” (Appendix I). This student reports through the last student interview that it was learned that “I need to make sure everyone gets time to talk” (JB8, personal communication, April 9, 2018). Shannon also noted, in her Teacher Reflection Journal, joining two collaborative groups for academic support to address group members with low self-efficacy. Therefore, the Teacher Reflection Journal (Appendix F) was powerful in allowing us to plan necessary emotional interventions with students that seemed disengaged at the beginning of our study. Emotional group work gains were made through these interventions.

Cognitive Engagement

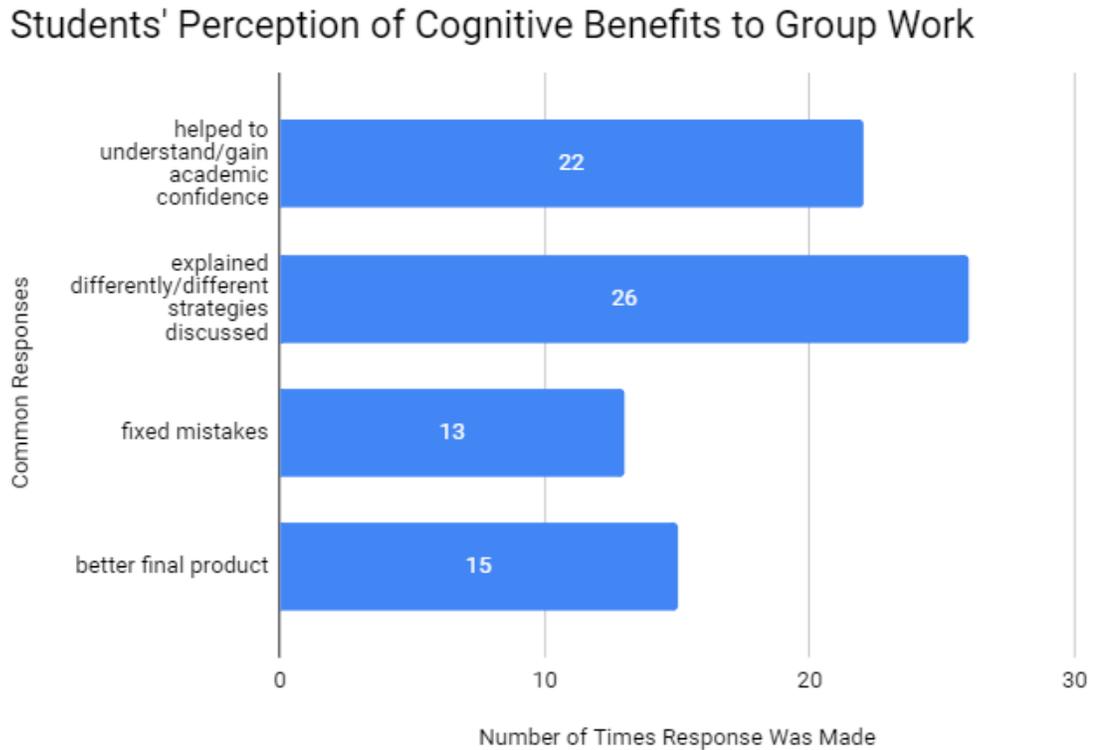
Cognitive engagement in a classroom is a students’ ability to put effort into understanding a topic and persist with learning. We collected data on this domain of engagement through collaborative small groups. Data from our student survey shows that perceived cognitive engagement went from 97% of the students reporting that they perform better with a group in the beginning, down to 83% at the end of the data collection periods (Figure 3). However, we received much validation through student conferences that collaboration was a positive experience for students cognitively. One student admits that “I would have gotten it wrong but my team helped me to understand the right answer” (JM2, personal communication, March 5, 2018). Yet another student says group work is valuable because “if I get an answer and the other person doesn’t get that answer, we will talk about it and we can share answers and they can ask why you got

those" (JM8, personal communication, March 8, 2018). We have an overwhelming response of positive comments about collaborative groups and how they help students think. A few other students report, "I feel more confident about my answers if other people have them, too" and "we think together as a group" (ST3, personal communication, April 4, 2018), "I understand more when I don't have to do it all by myself" (ST4, personal communication, April 4th, 2018), and "We put all our ideas together so it's more detailed" (ST6, personal communication, April 4, 2018). In the final week of data collection with regard to groups and student cognitive learning, students still reported positive comments, "If someone on my team doesn't know how to do it, I'll try to help them figure it out" (JB2, personal communication, April 9, 2018) and "my partner was able to help me think through it a little simpler" (JB4, personal communication, April 9, 2018). Additionally, another student commented at the end of a science laboratory task, "[Teamwork] made my investigation skills better" (ST1, personal communication, May 2, 2018).

Figure 3. Students' Perception of Group Performance vs. Individual Performance



Despite the decrease in self-reported cognitive engagement on the Semantic Differential Rating Scale over the course of the study, 24 students at the end still remained positive or neutral regarding group performance over individual performance, which is more than the number with the perception that they worked better on their own (Figure 3 above). Throughout the study, many students in the three settings commented on appreciating the help from their teammates. Figure 4 below shows the number of times different responses were made by students that tied to their cognitive engagement. The most common response from students was the benefit of having others to talk through different strategies, which was mentioned 26 different times by students during the conferences over the course of the study.

Figure 4. Students' Perception of Cognitive Benefits to Group Work

Sometimes students struggled to engage cognitively with their group for a variety of reasons. A student in Jaymeson's class mentioned being frustrated with students in the group just waiting for an answer and then copying it down themselves. When asked about a good way to handle this problem, the student responded by saying, "We decided to try to keep our answers secret but only talk about the process until the very end and then compared our answers. We thought this might help to get everyone working on it" (JM5, personal communication, April 5, 2018). Later, this same student commented that they were learning to "capitalize on strengths" in their group (JM5, personal communications, April 5, 2018). Although this was not a strategy all groups tried, it ended up helping this group overcome the problem that persisted with one of the group members. Improvements with individual students were observed within the cognitive engagement domain. One student commented that their group "argued when one person

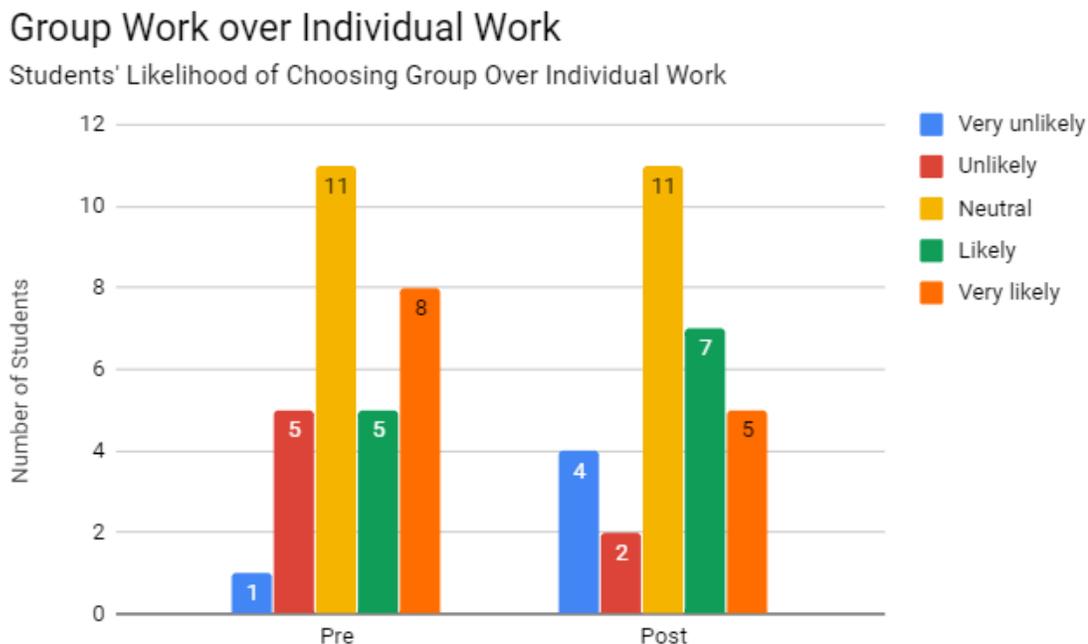
had an answer and another had a different answer, it was hard to compromise” (JM4, personal communication, March 5, 2018), but at the end of the study, the same student said the group continuously helped him understand. The student said they were “teaching the group that there’s many ways of finding the answer” (JM4, personal communication, May 25, 2018). This same student went from having “neutral” feelings about group work at the beginning of the research, to deciding they were “likely” to choose group work over individual work. Another student, during the first week of group work in Jaymeson’s classroom, claimed that group work was difficult because “[group members] didn’t always listen to each other, which was challenging” (JM7, personal communication, March 7, 2018). By the end of the study, the same student chose group work over individual work because of the ability to “hear everyone’s ideas and change my thinking” (JM7, personal communication, May 25, 2018). Another student in Shannon’s class was grouped with three other students of the opposite gender, which initially made the student in the student visually uncomfortable, as reported in Shannon’s Teacher Reflection Journal, and this student initially reported a score of ‘3’ out of 5 on their group performing better than they would individually. However, by the end of the study, this student reported a score of ‘5’ on the same question and commented “If I didn’t understand part of it, they would help me with it” (ST8, personal communication, May 2, 2018), thus, showing growth. Overall, observational and conferencing data supported academic benefits to collaborative group work for many students. Although there were a few reported conflicts, students did improve on their already established ability to collaborate on a cognitive level.

Behavioral Engagement

Behavioral engagement is something that can be observed noting student effort, attention, participation, time on task, and involvement in group learning. Between our pre- to post-questionnaire collection periods, students' perceived behavioral engagement during small group work remained consistent. Appendix J shows common responses on the questionnaire from students who prefer individual work, which responses mostly fell under the behavioral domain, suggesting they would rather have the independence so they do not have to deal with others' learning styles, speed, or terms. Another interesting note is that only five of 29 students chose to respond to this open response question. All five students responded with statements describing not being in control of the situation, such as "I get to do what I want" and "I can get things done faster." Therefore, students who struggled to engage cognitively with their group were frustrated that they did not have control of their group members' work ethic or learning speed.

However, despite these behavioral concerns many of the students' perceptions remained consistent when considering the idea of group work, particularly based on the question about whether they would choose group work over individual work (Figure 5).

Figure 5. Group Work vs. Individual Work



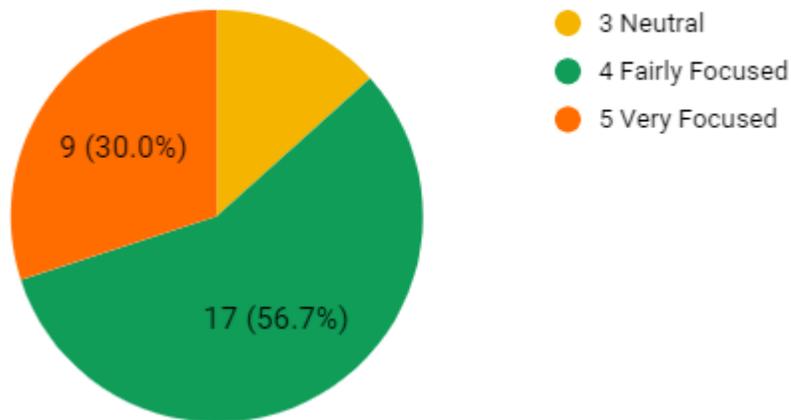
The total number of students that preferred group over individual work essentially stayed the same, ranking it higher than the alternative, with 24 students preferring group work on the pre-questionnaire and 23 preferring it on the post-questionnaire. Few students were unlikely to choose group work, with only six not preferring group work on both pre- and post- questionnaires. As some students implied, group work was not ideal due to behavioral concerns. Figure 5 shows a visual representation of students' perceptions of their individual ability to focus. They suggest that focus actually decreased over the seven weeks during the study and the side-by-side pie graphs show these declines. The student responses for possible reasons for tension within their groups varied but students thought their tension was due to off-task behavior in the beginning, but changed to having more concern about the different academic levels at which students in the group worked (Appendices K & L). While two classrooms switched

collaborative groups halfway through the study, one decided to keep their groups the same. Figure 6 shows that a total of 87% of the students rated their behavior during group work as focused (four or higher), while only 72% thought their behavior was focused by the end of the study.

Figure 6. Students' Perception of their Own Behavior During Group Work

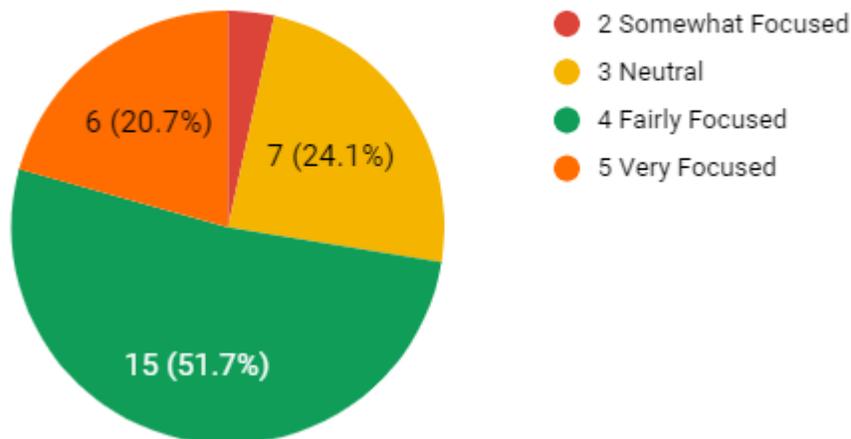
Behavioral (pre)

I would rate my participation during group work as...



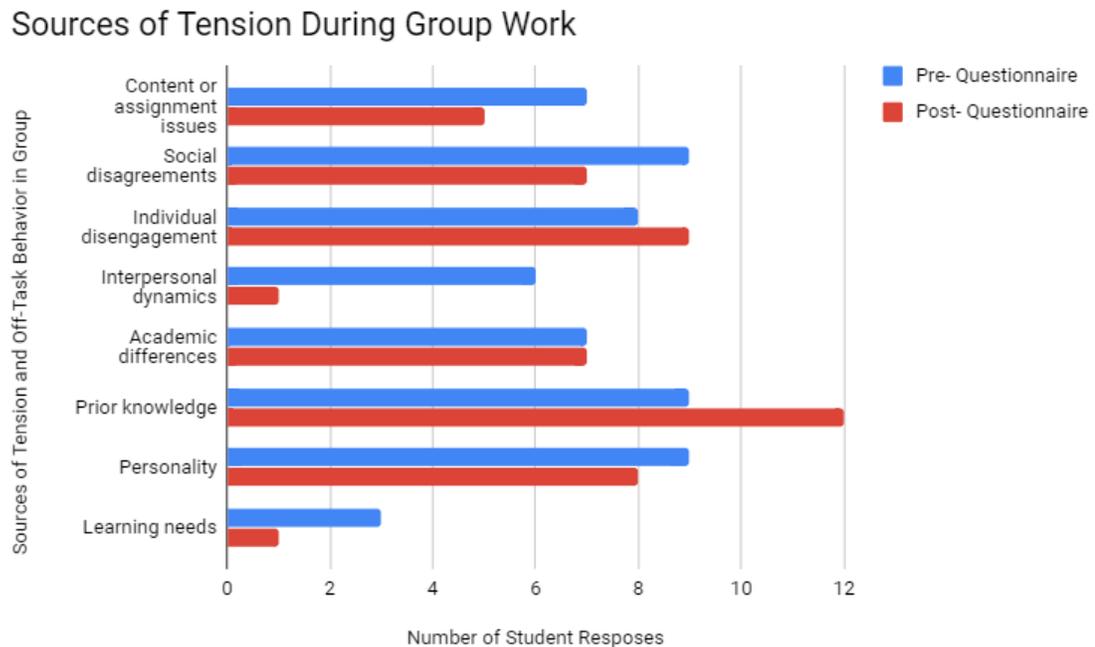
Behavioral (post)

I would rate my participation during group work as...



Many behavioral struggles were reported and observed during group work. At times students struggled with social disagreements, interpersonal dynamics, learning needs, academic abilities and other areas as shown in Figure 7 below. Student comments, such as “I don’t really work with them much” (ST2, personal communication, April 4, 2018), and “Not everyone always participated” (JM9, personal communication, May 11, 2018) indicated that students struggled to stay behaviorally engaged at times. However, only seven percent of students reported challenges coming up “often” in the beginning and 10% of the students reported these challenges at the end of the study. These results indicate that few students thought the challenges that arose during work time happened often enough to report.

Figure 7. Students’ Perception of Sources of Tension in Group Work



We do note improvements in group behavior from the beginning of our study to the end through our student interview tool. As data collection began students reported some frustration such as "fighting over what the answers are." (JM8, personal communication, March 7, 2018) and "some kids were laughing and off-task" (JM10, personal communication, March 7, 2018). Teamwork strategies were taught and given as reminders as we started our data collection and reviewed throughout the process. Students were beginning to understand how to behave as a team and we found evidence of this in their comments, "some knew the computer work better so it was good to ask for help" (JM3, personal communication, March 19, 2018) as well as one team shared that they "split things up, our team sorted things out, that helped" (JM10, personal communication, March 19, 2018).

By the end of our data collection period, students were better equipped to work with teammates noting that collaboration seems to be positive, "If somebody is available to work with I would choose that. It makes getting work done faster." (JB7, personal communication, April 9, 2018). Students also learned valuable teamwork behaviors and shared that during their exit interviews "I need to look at the person speaking" (JB8, personal communication, April 9, 2018). As noted earlier in this analysis, Appendix I was created as an intervention tool for one particular student. This tool became very powerful for this student as it focused primarily on team work behaviors such as: looking at the person talking, tone of voice when speaking, time on task, and taking turns while working. The student that used this tool comments about relying heavily on "my checklist needs to be by me so I can remember how to work with my team" (JB8, personal communication, April 9, 2018). The behavioral engagement domain was the area we saw

the fewest amount of negative changes between our early and late data, which may suggest that middle school students already had an understanding of behavioral expectations in collaborative work prior to our action research.

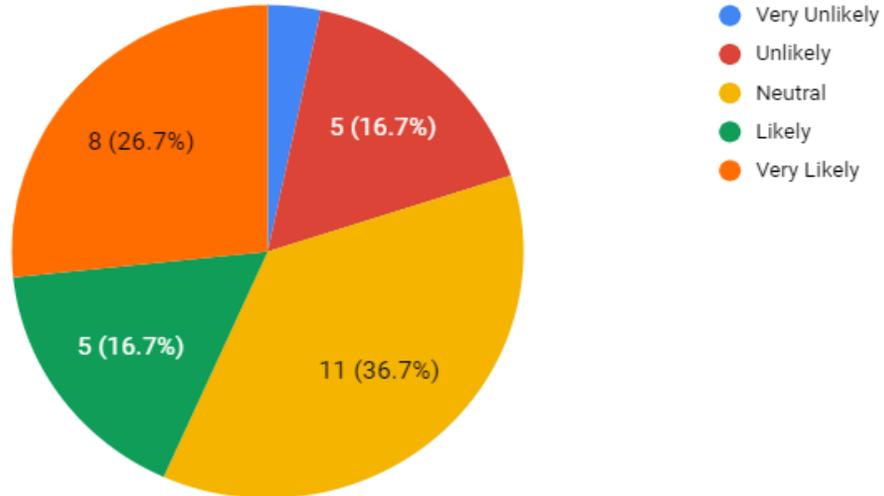
Conclusions

Our research team has identified conclusions with regard to how collaborative student grouping affects engagement in a middle school classroom. Selecting an appropriate definition for engagement was crucial for beginning this action research project, requiring some critical and collaborative discussion as well as research among our team. The multidimensional definition of engagement we used allowed our team to easily create data tools. By focusing on emotional, behavioral, and cognitive components of engagement we were able to record observations with regard to engagement making human behaviors quantitative. Again, we collected data under three different engagement domains: emotional, cognitive, and behavioral. Domains set aside in an overall student opinion, as you can see in Figure 8 below, students' preference toward working with a team versus individually stayed consistent during the study with 24 students at neutral, likely, and very likely during our pre- questionnaire. Upon the post-questionnaire, 23 students expressed a neutral, likely, or very likely opinion with regard to preferring group work.

Figure 8. Likeliness to Choose Group Work over Individual Work

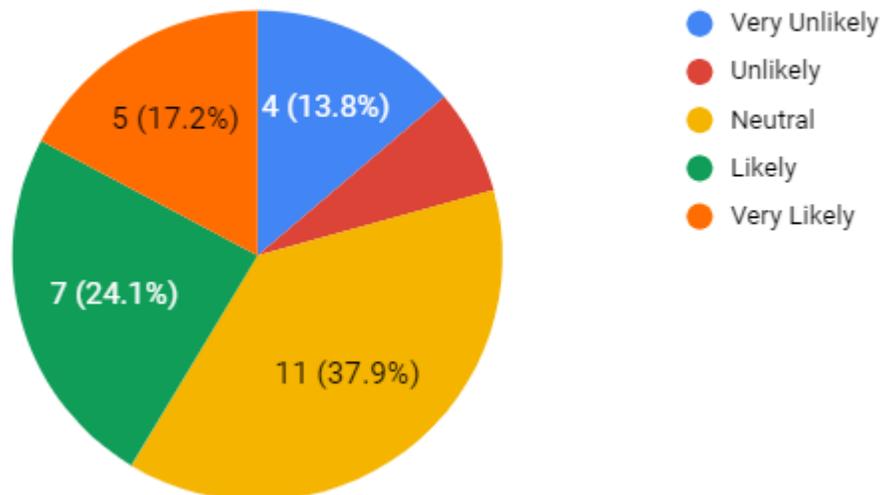
Overall (pre)

How likely are you to choose group work over individual work?



Overall (post)

How likely are you to choose group work over individual work?



It is possible that the groups changing in two of the classrooms but not in the third could have had an effect on the results of the study. We have discussed how that particular classroom may have had a lack of teamwork focus as the group did not change

during the study; however, that classroom's results still remained on the positive side of collaborative engagement. When considering each of the domains (emotional, cognitive, behavioral) during our study, we noted that the quantitative data did not show great gains in students' ability to engage during group work. However, the qualitative data, such as student conferences, teacher observations and teacher journals, were powerful and seem to speak to us in a relevant way.

Much was heard from students with a regard to appreciating the value of teamwork and the power of collaboration. The student conferences allowed us to make immediate changes in our instruction and do on-the-spot interventions with individual students and groups. Our teacher reflection journal was instrumental in discovering interventions needed with particular students, but more study would be beneficial in working with groups to make these interventions as productive as possible. Determining an intervention needed allowed teams to function at a higher level which was a positive experience for more students.

Action Plan

Based on the findings of our Action Research, we drew several conclusions. First, students self-reported that they had no increase in enjoyment for collaboration and teamwork from pre- to post-data collection. When surveyed, the quantitative data collection fell flat as far as drastic results. However, there were slight differences in emotional, cognitive, and behavioral quantitative data which showed minimal increases or decreases in student engagement over the course of our study. Second, when pairing our qualitative data with our quantitative data, we were able to recognize more powerful

findings. Student interviews showed valuable dialogue between teacher and student, and student to student, regarding student engagement during small group work.

As professional educators, we feel as though student responses may have provided partially biased research information due to middle school students giving answers they think their teachers want to hear. However, the majority of students' comments about their group work were positive and enlightening for us as researchers, which leads us to believe some bias would not significantly affect the results of the study. Students realized their work was completed at a higher cognitive level when collaborating with a teammate and were able to articulate those thoughts during our study.

Finally, our work as researchers engaging in journaling and student interviews was a powerful way to be reflective about our professional practice. This practice allowed teachers to watch behavior and plan interventions to reach learners. Listening to students and their impressions of activities in the classroom also informs teachers on the effectiveness of their instruction and practice.

After establishing collaborative groups and analyzing the changes involving student engagement in our classrooms, we found strategies and practices we will continue to use and things we want to build on more in the future, such as teaching collaborative skills, conferencing with students and groups, proximity control, and redirection of unacceptable behaviors. Because math and science can be difficult subjects at the middle school level, and evidence shows that girls and students from marginalized backgrounds are more likely to succeed in classrooms that use collaborative grouping strategies (TPT, 2013) we will continue to encourage our students to engage in conversations through

collaborative grouping. We would like to set up group and teamwork expectations in our classrooms and build upon that as the year goes on.

If the students understand their role during collaborative group work, these opportunities will prove much more productive learning opportunities throughout the year. Once this group work is well-established in the classroom, teacher observation can happen, which allows time for unique interventions to be created for struggling students. Regularly changing the groups in which students' work might positively impact levels of engagement, which would be something we might try in the future. Understanding more about effective ways to handle behavioral issues that happen within groups would also guide our group work in the future.

Group work has a positive effect on student engagement and learning. Through this research, we learned that students feel more confident in their ability to understand skills learned when they can practice, investigate, and explore with a teammate. Collaboration is engaging for students, as we learned they enjoy the social, cognitive and emotional aspects of working together. In addition, students are taught valuable career skills through collaboration. Direct instruction on collaboration skills were implemented before our research began. Throughout the research, students became proficient at communication, patience, sharing, brainstorming, and acceptance of others and their ideas. All these behaviors are extremely important skills needed as they look toward college and career readiness. We understand, after our research, that collaboration has an impact on student engagement and should continue in the classroom to support a higher level of learning for students.

After reviewing our data, our research team considered how different student demographics, such as gender, race, and special education qualifications, might affect engagement in collaborative groups. Although our analysis of these sub-groups was inconclusive due to an insignificant number of students in each category, with further study, we may have been interested in the opportunity to look for significance in those factors and the students' abilities to function and collaborate effectively within their groups.

More research specific to the middle school age and developmental state might be necessary for building teamwork strategies in the classroom specifically beneficial for early teenagers, as they are a unique age group. It would also be helpful to do some more research on different strategies for choosing groups - based on gender, academic ability, or nature of activity to instruct our teams. Along those same lines, it would also be interesting to find out how using commercial collaborative grouping strategies, such as the Kagan Cooperative Learning[1] [2] [3] Program, affects student engagement. Future research may help us further understand how to best maximize cognitive, behavioral and emotional engagement in the middle school classroom.

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Appendix A

**The Effects of Collaborative Grouping on Student Engagement
Parental Permission Form**

January 2, 2018

Dear Parents,

In addition to being your child's sixth grade math/STEM/Science teacher, I am a St. Catherine University student pursuing a Masters of Education. As a capstone to my program, I need to complete an Action Research project. I am going to study the effects of collaborative grouping on student engagement because I hope to see a positive impact on student learning.

In the coming weeks, I will be strategically grouping students as a regular part of my instruction. All students will participate as members of the class. In order to understand the outcomes, I plan to analyze the data obtained from the results of this collaborative grouping to determine if it has an impact on student engagement. All strategies implemented and assessments given are part of normal educational practice.

The purpose of this letter is to notify you of this research and to allow you the opportunity to exclude your child's data (Semantic Differential Rating Scale, Student Observation Data Collection Tool, Student Conference, and Teacher Reflection Journal) from my study. Data will be collected using four different methods. First, a Semantic Differential Rating Scale will allow students rate their experience during collaborative group work. Second, students will be observed by an adult during group work using a Student Observation Data Collection Tool. Third, transcribed audio recordings of Student Conferences lead by the teacher will be used to discuss group work experience. Fourth, will be a reflective teacher journal. At the conclusion of the study, all audio recordings will be destroyed.

If you decide you want your child's data to be in my study, you do not need to do anything at this point.

If you decide you do NOT want your child's data included in my study, please note that on this form below and return it to me before the end of the school year. Note that your child will still participate in the lesson but his/her data will not be included in my analysis.

In order to help you make an informed decision, please note the following:

- I am working with a faculty member at St. Kate's and an advisor to complete this particular project.
- It is hoped that through your participation, I will learn more about how I can improve student engagement in collaborative projects. Risks are minimal for involvement in this study.
- I will be writing about the results that I get from this research. However, none of the writing that I do will include the name of this school, the names of any students, or any references that would make it possible to identify outcomes connected to a particular student. Other people will not know if your child is in my study.
- The final report of my study will be electronically available online at the St. Catherine University library. The goal of sharing my research study is to help other teachers who are also trying to improve their teaching.
- There is no penalty for not having your child's data involved in the study, I will simply delete his or her responses from my data set. If you have any questions, please feel free to contact me. You may ask questions now, or if you have any questions later, you can ask me, or my advisor Siri Anderson (ssanderson2@stkate.edu), who will be happy to answer them. If you have questions or concerns regarding the study, and would like to talk to someone other than myself, you may also

contact Dr. John Schmitt, Chair of the St. Catherine University Institutional Review Board, at (651) 690-7739.

You may keep this form for your records.

Jaymeson Miller/Jeanine Backer/Shannon Timmer

Date

OPT OUT: In order to exclude your child's data from the study, please sign and return any time before the completion of the school year.

I do NOT want my child's data to be included in this study.

Signature of Parent

Date

Appendix B

National Geographic Personality Quizzes

1. What Superpower Should You Have?

<https://kids.nationalgeographic.com/games/quizzes/what-superpower-should-you-have/>

2. What Musical Instrument Are You?

<https://kids.nationalgeographic.com/games/quizzes/what-musical-instrument/>

3. What Planet Should You Call Home?

<https://kids.nationalgeographic.com/games/quizzes/planets-personality/>

Appendix C

Semantic Differential Rating Scale

1. Overall, my feelings about working with my group are...
Not good. 1 2 3 4 5 Excellent!
2. Our group members associate with each other outside of the assigned task...
Never- we Quite often- we consider
only talk when a ourselves friends with
task is at hand 1 2 3 4 5 each other
3. I would rate my participation during group work as...
Not focused at all 1 2 3 4 5 very focused
4. I would rate the overall participation of our group as...
Not focused at all 1 2 3 4 5 very focused
5. Members of our group work together...
None of the time, Most of the time, we all
we each did our contributed something as we
part separately 1 2 3 4 5 worked in a group
6. During our group work, everyone participates...
Different amounts-
not equally 1 2 3 4 5 The same amount
7. Challenges came up during group work...
○ Rarely ○ Sometimes ○ Often
8. Amount of time lost to group challenges or group conflicts...
1. Small percentage of our work time
2. Half of our work time
3. Most of our work time
4. Varies
9. Sources of tension and off-task behavior in our group... (please check all that apply)
 - Content or assignment issues - the work just doesn't interest us or seem worth our attention, we don't see how it is relevant to our lives or interests
 - Social disagreements -- not related to the academics (e.g. something about friendships, interests outside of the classroom)
 - Individual disengagement -- for reasons that may or may not be clear one or more students in the group do not participate appropriately
 - Interpersonal dynamics-- one or more of the group members want to do the project differently and can't find a way to peacefully come to an agreement

- Academic differences -- one or more of the group members don't interpret the content in the same manner, and we can't find a way to use those different understandings to all learn more
- Prior knowledge -- one or more group members are either struggling to catch up with the content knowledge or already believe/seem to know everything about the topic
- Personality -- some extroverts, some introverts, or cultural differences seem to get in the way of staying engaged/focused
- Learning needs -- a student's unique attributes make it hard for him/her to collaborate (student is learning English, on the autism spectrum, has reading disability, is blind or hearing impaired etc.)

10. Please describe sources of tension you have experienced with group work.

11. How likely are you to choose group work over individual work?

- Very unlikely
- Unlikely
- Neutral (don't care either way)
- Likely
- Very likely

12. The reasons I prefer individual work over group work are...

13. The reasons I prefer group work over individual work are...

14. Our group performs better together than I would individually.

Strongly disagree 1 2 3 4 5 Strongly agree

15. How likely are you to choose the same group to work with again?

Not likely at all! 1 2 3 4 5 Very likely!

Appendix D

Student Observation Data Collection Tool

A predetermined sample of 10 individuals in the classroom will be taken. The observer should record the level of engagement for the same sample of students every other week. At the indicated time, the observer records the student behavior at that moment using the key provided.

Key

4 = Meaningful conversations for deeper learning (**cognitive engagement**)

3 = Engaged/On task/seems interested (**emotional engagement**)

2 = Quietly occupied with something other than expected task (**behavioral engagement**)

1 = Out of seat, talking unrelated to task, possibly distracting others (**behavioral engagement**)

Teacher: Topic: Lesson:

Start Time: End Time: Date:

Observer:

Student	0 min	5 min	10 min	15 min	20 min	Observations	Teacher Analysis
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

Appendix E
Student Conference

Student's identifier:
Teacher:
Date:

Researcher prompt: Overall, how are things going in your team?
Student response:

Researcher prompt: Describe the task you are working with a team is helping your learning. ?
Student response:

Researcher prompt: Give examples of how working in a team is better than if you work on a task alone.
Student response:

Researcher prompt: Describe some challenges your team is having.
Student response:

Researcher prompt: What advice might you give teams to overcome challenges?

Student response:

Researcher prompt: Is the task you're working on challenging and/or interesting to you? What suggestions do you have for me in designing this team project for students next year?

Student response:

Researcher prompt: Is there anything I (the teacher) could do to help you/your group work better together?

Student response:

Researcher prompt: If you had it to do over, would you choose to work in this group or work alone? Why?

Student response:

Appendix F

Teacher Reflection Journal

Date: Time:

	Engagement	Collaboration	Reflections (changes from last observation)
observations			
inferences			
other			

Actions taken to **scaffold or extend** the content to align with student needs:

To what extent did today's group work or class time afford any/all of the following:

- Increase exposure to new topic appropriate discrete knowledge/vocabulary (e.g. readings, lecture, video, podcast...)
- Opportunity to apply or process that new learning in novel context
- Ability to clarify understanding through active dialogue
- Movement
- Reading
- Writing
- Speaking
- Creative outlet
- Critical thinking
- Use of computers for
 - Information seeking (seeking unknown answers from varied sources)
 - Organization (e.g. managing new learning, resources)
 - Collaboration (e.g. Google Docs, Skype with expert)
 - Presentation (e.g. creating a video, powerpoint, web page)
 - Rote demonstration of learning (e.g. online worksheet)

If some students were not appearing to remain engaged today which of the following steps did I use, if any, to re-engage the learner(s) who were off task or disengaged:

- Proximity (stood nearby without directly engaging)
- Joined group academic support (addressed the content not the behavior)
- Joined group soft-skills support (re-taught the skills for appropriate small group collaboration)
- Private conversation with individual -- inquiry (friendly tone, seeking to understand student needs)
- Private conversation with individual -- directive (authoritative tone, seeking to establish compliance)
- Scaffolded content to make it more/less difficult for student to understand the materials they were learning (video, podcast, higher or lower level readings, outline etc.)
- Redirected by pointing to written directions - the third point
- Spoken reminder to individual
- Spoken reminder to whole class
- Group processing conversation: teacher-led
- Group processing conversation: student-led
- Encouraged students to speak in first language if not English/provided translation tools
- Student removed from group -- non-punitive (Susan can you run an errand for me?)
- Student removed from group -- punitive (Susan take a time out...)
- Sought assistance of additional resource teacher (para, SPED, ELL etc.)
- Communicated with parent -- student made the call
- Communicated with parent -- teacher call/email

Main lesson from the interventions I tried to use with student(s) challenged to stay engaged today:

Appendix G

Semantic Differential Rating Scale Results

Questions
the table

*The number of respondents are listed in

	1	2	3	4	5	Mean	Median	Mode
Overall, my feelings about working with my group are...	Not good				Excellent			
Pre	0	1	6	15	8	4	4	4
Post	1	10	8	7	3	3	3	2
Our group members associate with each other outside of the assigned task...	never				Quite often			
Pre	2	7	9	5	7	3.3	3	3
Post	6	6	7	3	7	3	3	3
I would rate my participation during group work as...	Not focused				Very focused			
Pre	0	0	4	17	9	4.2	4	4
Post	0	1	7	15	6	4	4	4
I would rate the overall participation of our group as...	Not focused				Very focused			
Pre	0	0	2	17	11	4.3	4	4
Post	1	1	4	17	6	3.8	4	4
Members of our group work together...	None of the time				Most of the time			
Pre	0	0	7	11	12	4.2	4	5
Post	1	0	4	13	11	3.9	4	4
During our group work, everyone participates...	Not equally				Equally			
Pre	0	0	11	8	11	4	4	3
Post	2	9	10	7	1	3.1	3	3

Challenges came up during group work...	often		sometim es		rarely			
Pre	2	n/a	15	n/a	13	3.73	Sometimes 3	Sometimes 3
Post	3	n/a	15	n/a	11	3.6	Sometimes 3	Sometimes 3
Amount of time lost to group challenges or group conflicts...	most	varies	half		small			
Pre	1	7	1	n/a	21	4.1	Small 5	Small 5
Post	1	5	6	n/a	17	3.9	Small 5	Small 5
How likely are you to choose group work over individual work?	Very unlikely	Unlikely	Neutral	Likely	Very likely			
Pre	1	5	11	5	8	3.5	Neutral 3	Neutral 3
Post	4	2	11	7	5	3.3	Neutral 3	Neutral 3
Our group performs better together than I would individually.	Strongly disagree				Strongly agree			
Pre	0	2	12	8	8	3.7	4	3
Post	2	3	14	3	7	3.3	3	3
How likely are you to choose the same group to work with again?	Not likely				Very likely			
Pre	3	3	10	4	10	3.5	3	3
Post	3	7	4	8	7	3.3	4	4

Appendix H

Student Reasons for Preferring Group Work over Individual Work

<i>Pre- Questionnaire</i>		<i>Post- Questionnaire</i>		<i>Domain</i>
<i>Reason</i>	<i># of Responses</i>	<i>Reason</i>	<i># of Responses</i>	
Additional help/ideas/learning	10	Additional help/ideas/learning	7	Cognitive
Getting work done faster	2	Getting work done faster	2	Behavioral
Learning style/fun	1	Learning style/fun	5	Emotional
Concentration	2			Cognitive

Appendix I

Student Group Work Checklist

Everyone gets a turn to talk	1	2	3	4	5
Be accepting of other's ideas even if you don't agree	1	2	3	4	5
Look at the person talking	1	2	3	4	5
Use a calm gentle tone of voice when speaking	1	2	3	4	5
Work on the task your are given	1	2	3	4	5

Student or Teacher Notes:

Appendix J

Student Reasons for Preferring Individual Work over Group Work

<i>Pre- Questionnaire</i>		<i>Post- Questionnaire</i>		<i>Domain</i>
<i>Reason</i>	<i># of Responses</i>	<i>Reason</i>	<i># of Responses</i>	
Independence (learning style, speed, not being told what to do, working on own terms)	4	Independence (learning style, speed, not being told what to do, working on own terms)	4	Behavioral
Not having to share a grade/Doing more work than others	1	Not having to share a grade/Doing more work than others	1	Cognitive
Not having to show their work to others	1			Emotional

Appendix K

Sources of Tension Reported during Group Work

<i>Pre- Questionnaire</i>		<i>Post- Questionnaire</i>		<i>Domain</i>
<i>Type of Tension</i>	<i># of Responses</i>	<i>Type of Tension</i>	<i># of Responses</i>	
Off-task behavior (talking, people not working, joking around, someone yelling)	6	Off task behavior	3	Behavioral
Working at different speeds (not getting it, moving ahead)	3	Working at different speeds	7	Cognitive
Arguing/Disagreeing	2	Arguing/Disagreeing	4	Emotional
Stated there were no sources of tension	13	Stated there were no sources of tension	7	
		General comments about tension (ex. "A lot")	2	

Appendix L

Checklist question:

Sources of tension and off-task behavior in our group... (check all that apply)	Pre	Post
Content or assignment issues -- the work just doesn't interest us or seem worth our attention, we don't see how it is relevant to our lives or interests	7	5
Social disagreements -- not related to the academics (e.g. something about friendships, interests outside of the classroom)	9	7
Individual disengagement -- for reasons that may or may not be clear one or more students in the group do not participate appropriately	8	9
Interpersonal dynamics-- one or more of the group members want to do the project differently and can't find a way to peacefully come to an agreement	6	1
Academic differences -- one or more of the group members don't interpret the content in the same manner, and we can't find a way to use those different understandings to all learn more	7	7
Prior knowledge -- one or more group members are either struggling to catch up with the content knowledge or already believe/seem to know everything about the topic	9	12
Personality -- some extroverts, some introverts, or cultural differences seem to get in the way of staying engaged/focused	9	8
Learning needs -- a student's unique attributes make it hard for him/her to collaborate (student is learning English, on the autism spectrum, has reading disability, is blind or hearing impaired etc.)	3	1